# MACHINE DESIGN

# **1979 EDITORIAL** INDEX

Volume 51—January to December

# **AUTHOR INDEX**

### Α

Abramovich, Abe—"Software for Faster Contouring," June 21, p. 119
Alexander, Peter—"Array Processors," Aug. 23, p. 87
Aronson, Robert B.—"Fighting Rolling Resistance in
Tires," Jan. 11, p. 30
"Stirling Engine Goes Commercial," Feb. 8, p. 26
"Adhesives are Getting Stronger in Many Ways,"
Feb. 8, p. 54
"Pusion Power: We'll Have It if Money Can Buy It,"
Apr. 26, e. 32

Apr. 26, p. 30 "Student Designers Look at Health Care," June 7,

"Student Designers Look at Health Care," June 7, p. 18
"Ski-Jump Launch Boosts VSTOL Performance," June 7, p. 24
"Solar Boilers Get Hot," July 12, p. 20
"Krypton Gas Detects Surface Microflaws," Aug. 9, p. 97

p. 97 "RECREATION: Fun is Big Business," Aug. 23, p.

"Edging Toward Activism," Sept. 20, p. 154
"Peat Power: Fuel by the Bog." Oct. 11, p. 20
"Super Satellites Promise Practical Pay Off," Nov. 8, p. 18 "Flight Plan for Tomorrow: New Shapes, New Ma-terials," Dec. 6, p. 36

### B

Baboian, Robert-"Controlling Galvanic Corrosion," Oct. 11, p. 78
Banks, Mark T.—"Plastics for the Tough Jobs," Sept.

6, p. 88
"Fine-Tuning the Engineering Thermoplastics,"

Nov. 22, p. 103

Barton, Lyndon O.—"Simplified Slider-Crank
Equations," Apr. 12, p. 110

"Painless Analysis of Four-Bar Linkages," July 26,

P. 124
Beercheck, Richard C.—"MACHINE TOOLS: Cut-ting Edge of Technology," Jan. 25, p. 18
'Precision Hydraulics Take On Rugged Jobs."

June 7, p. 78
"Putting the Heat on Seal Materials," Oct. 25, p. 124 Bhushan, Bharat—"Sputtered Coatings for Gas

Bhushan, Bharat—"Sputtered Coatings for Gas Bearings," Aug. 9, p. 96 Birnbrauer, Herman—"How to Handle the Problem Engineer," June 7, p. 68 Boothroyd, G. and C. Ho.—"Avoiding Jams During Assembly," Jan. 25, p. 130 "Reducing Disc.-Assembly Problems," Mar. 8, p. 79 Boggs, Roy—"Cale Program Sizes Cylinder-Crank Linkages, Dec. 6, p. 166 Brack, J. W.—"Random Numbers with Software," Feb. 8, p. 76 "Finding Hardware Faults with Software," Feb. 22, p. 175

Bronikowski, Ray J.—"Down-to-Earth Advice for the New Manager," May 10, p. 56 "Managing the Engineering Interface," Aug. 23, p.

"Managing the Engineering and Table 174 Rooke, E. Raymond—"Where the Mechanical Way Still Makes Sense," Jan. 11, p. 80 Bryson, Frederick E.—"Finishes That Fight Corrosion," Nov. 8, p. 96 Burnet, George—"Colleges Can't Do It All," Sept. 20, p. 138

### C

Caldwell, George M.—"Calc Program Spaces Holes Around a Circle," Oct. 11, p. 100 Carlisle, Ben H.—"Predicting Product Profitability," Apr. 26, p. 150 "Space Saving in Electrical Packaging," Aug. 9, p.

Carlson, John G.-"Testing New Products," Aug. 23,

p. 96 Carmi

Carison, John G.— Testing New Products, "Aug. 23, p. 96
Carmichael, Roger—"Simplified Optical Design," Nov. 8, p. 113
Caghili, Timothy L.—"Prototyping Investment Castings," Jule 2, p. 93
and the Patent Law." June 7, p. 92
"Avoiding the Pitfalls in Patent Procurement," July 12, p. 54
Colvert, Dominic P.—"Coping With Government Regulations," July 12, p. 86
Comella, Thomas M.—"BUSINESS MACHINES: Harnessing the Information Explosion," June 21, p. 24

Harnessing the Information Explosion," June 21, p. 24
"Toward the 'Do Everything' Business Machine."
Dec. 6, p. 30
Constance, John D.—"Encouraging Registration
Through an In-House Program," Oct. 11, p. 66
Cox, Gerald—"Storing Data in Magnetic Bubbles,"
Mar. 8, p. 60
Curry, David T.—"Sputtering Comes Out of the
Clean Room," Jan. 11, p. 95
"Faster Carburizing with a Plasma," Jan. 25, p. 128

128 "Taking Sheet Metal to the Limit," Feb. 22, p. 170 "Decorating Thermoformed Parts," Mar. 22, p. 128 "Understanding Antirust Chemistry," July 12, p.

58 "Metals That Remember," Oct. 25, p. 113

Dalal, Harish M.—"Coming Soon: Practical Ceramic Bearings," Mar. 8, p. 55 Dann, Richard T.—"Hydraulic Technology Stacks Up Gains in Power and Precision," Jan. 11, p. 84 "AEROSPACE: The Sky Is Not the Limit," Mar. 22 p. 18

Dearth, David R.—"Finding Deflections of Complex Beams," Oct. 11, p. 98 Dreger, Donald R.—"Plastics for 'Load-Bearing Parts," May 10, p. 60 "Smooth, Ripple-Free Plastic Panels." June 21, p.

108 "Plastics That Stop EMI," July 26, p. 114

E

Ebisch, Robert and Lawrence A. Soltis—"Making Continuing Education Pay Off," Jan. 25, p. 100 Edgerley, Walter—"Instant Replay for Vibration Analysis," Nov. 22, p. 87 Edwards, Howard B.—"Large-Scale Optics Trim Light Bills," Apr. 12, p. 108
Eisbrener, Roger W., Herbert S., Peterson and Jack W. Moss—"Failsiae Brakes," Apr. 26, p. 170
Eitzen, Donald G.—"New Services for Calibrating Ultrasonic Test Systems, "Sept. 6, p. 170
Eitzen, Donald G.—"New Services for Calibrating Ultrasonic Test Systems," Sept. 6, p. 170
Eitzen, Donald G.—"New Services for Calibrating Ultrasonic Test Systems," Sept. 6, p. 185
Engel, Peter A.—"Predicting Wear in Misaligned Rolling Contect," July 26, p. 128
Erickson, Wally—"Narrow V-Belts," Jan. 25, p. 116
Erisman, Ralph J.—"Short Cuts for Designing Belleville Springs," Feb. 22, p. 136
Errichello, Robert—"Cale Program Finds Inverse of an Involute," Mar. 8, p. 80

Farris, John A. and Robert Favor—"Long Life for Hydrostatic Transmissions." Sept. 6, p. 96
Favor, Robert and John A. Ferris—"Long Life for Hydrostatic Transmissions." Sept. 6, p. 96
Fischer, James, Leon Orchard and Jerry Ramey—"Supporting Software-Based Systems—Part 2,"
Jan. 11, p. 100
Foord, Brian A.—"Computer Models Optimize Filter Selection." May 24, p. 100
Fuller, Don—"How to Write Reports That Won't be Ignored." Jan. 11, p. 76
"Be Your Own Efficiency Expert." Mar. 22, p. 98
"Picking the Right Person for that Supervisory Position." June 21, p. 104
"How to Run a More Efficient Department." Sept. 6, p. 74 6, p. 74
"The Mechanics of Management," Nov. 22, p. 82

Gajewski, Peter—"Determining Total Power-Supply Error," June 21, p. 130 Geremia, John O.—" "Screen Tests' for Product De-signs," Apr. 26, p. 176

### 1979 EDITORIAL INDEX

Gigten, C., and H. Toorens—"Understanding FET Probes," June 21, p. 132 Greene, Eric F.—"Pushbutton Design and Drafting." Feb. 22, p. 160 Griffin, Ray—"Chips That Chirp, Whistle, and Buzz," Nov. 22, p. 108 Gross, T. A. O.—"Saving Energy With Shaded-Pole Motors," July 12, p. 85 Gwilt, S. Roy—"Cale Programs Find Gear Geometry" May 10, p. 80

### н

Harter, Donald R.—"Saving Energy in Pilot-Operated Valve Systems," Apr. 26, p. 226 Heilman, Richard L.—"Precision Pumping," Feb. 22, Heilman, Richard L.—"rrectsson rumping, 1co. am, p. 165
Hertz, Daniel L., Jr.—"O-Rings for Low-Pressure Service," Apr. 12, p. 94
Ho, C. and G. Boothroyd—"Avoiding Jams During Assembly," Jan. 28, p. 137
Reducing Disc-Assembly Problems," Mar. 8, p. 79
Hudson, David H.—"Stress Analyzing Complex Parts," Nov. 8, p. 103

Jackson, Lois L.—"Simple Way to Predict Product Reliability," Aug. 9, p. 74 Jacobson, Richard A.—"HOME APPLIANCES: Im-proving the Good Life," July 26, p. 24 Jay, F. H.—"Miniature Zinc Die Castings," Mar. 22, p. 103

Kallis, Stephen A., Jr.—"Developing Software for Micro Applications," Feb. 8, p. 66 Kasper, Arthur S. and William E. Swenson— "Ending the Abuse of Young's Modulus," July 12, p. 80 Kessler, Frank J.—"Selecting Gasket Materials," Kessler, Frank J.—"Selecting Gasket Materials," June 21, p. 124 Kirby, David B.—"Selecting Compressed-Air Dryem," Apr. 26, p. 164 Kliger, Howard S.—"Customizing Carbon-Fiber Composites," Dec. 6, p. 150 Kravitz, Sidney.—"Software That's Easy to Debut," Apr. 26, p. 227 Krouse, John K.—"Aluminum PM Update," Feb. 8, p. 70
"Stress Analysis on a Budget," Mar. 8, p. 66
"CONSTRUCTION EQUIPMENT: Moving the
Earth with Technology," Apr. 12, p. 18
"Injection-Molded, Carbon-Fiber Composites,"
Aug. 9, p. 79
"A Troubled World Looks to Technology," Sept. 20, p. 120
"Predicting the Life of Mechanical Systems," Nov. 22, p. 96
"Show and Tell on a CRT," Dec. 6, p. 47

Lafreniere, B. C .- "Software for Stepping Motors," Larreniere, B. C.— Sottware for Stepping Motors," Apr. 26, p. 213 Larsen, Peter J.—"Natural Rubber Keeps Bouncing Back, "Jan. 25, p. 110 Laskin, Irving—"Solving Gear Center Distance Equations," Sept. 6, p. 103 Lavoie, John L.—"Cost-Effective Design Changes," Esb. 8, n. 52. Lavoie, John L.— Cost-Effective Design Changes, Feb. 8, p. 50—"New Directions in Switch De-sign," Mar. 8, p. 72 "Instrumentation in Product Design," Sept. 6, p. 78 Liu, Hua-Kuang—"Turning Acoustic Signals into Optical Images," Dec. 6, p. 167

### M

MacKenzie, Bruce A.—"HSLA Bar Steel for Lighter, Stronger Parts," Aug. 23, p. 93
Martini, Leonard J.—"Slanted O-Rings Extend Shaft Life," Feb. 8, p. 77
May, James P.—"Improved Power Springs Provide More Muscle," Nov. 8, p. 89
McCord, Bruce E.—"Designing Pneumatic Controls," Oct. 11, p. 92
"Air vs. Electrical Logic," Nov. 8, p. 108
McCrea, William J.—"Becoming Your Own Boss,"
Jan. 11, p. 107
Mcgegr, Robort H.—"Hardware and Water-Based Hydraulic Fluida," July 26, p. 120
Michelson, L.—"Greater Precision for Noncontact Sensors," Dec. 6, p. 117
Miniter, John J.—"Establishing an In-House Technical Library," Dec. 6, p. 168
Moss, Jack W. Roger W. Eisbrener and Herbert S. Peterson—"Failsafe Brakes," Apr. 26, p. 170

### N

Neugebauer, George H .- "Fitting Curves to Data." Sept. 6, p. 91
"Finding Shear Stress in a Rectangular Beam," "Finding Shear Stress in a Rectangular Beam," Oct. 25, p. 141 Newby, John R.—"Guidelines for Stampings," Apr. 26, p. 159 Nguyen, Toan C.—"Finding the Length of Web Ma-terials," Aug. 23, p. 97 Ninomiya, Mizuho—"Maintaining Ball Screw Preci-sion," Apr. 12, p. 105

Orchard, Leon, Jerry Ramey and James Fischer— "Supporting Software-Based Systems—Part 2," Jan. 11, p. 100 O'Rourke, Gerald—"Boots and Way Covers," Feb. 8, O'Rourke, Geraia— Boots and Way Covers, Feb. c, p. 61 Osgood, Carl C.—"Saving Weight in Bolted Joints," Oct. 25, p. 128 Owen, Robert P.—"Should You Make or Buy?" Dec. 6, p. 112

Parker, L .- "Selecting Drill Bushings," Mar. 22, p. Peake, H. J.—"Combating Engineer Obsolescence," Apr. 26, p. 223
Apr. 26, p. 223
Peterson, Herbert S., Jack W. Moss and Roger W.
Eisbrener—Failsafe Brakes, Apr. 26, p. 170
Protheroe, Alan and Todd Sutcliffe—New Hydraulic
Fluids Kick the Petroleum Habit, Jan. 25, p. 120

### R

Rago, Kenneth A.—"Preserving the Profit in New Product Development," Oct. 25, p. 140 Ramey, Jerry, James Fischer and Leon Orchard— "Supporting Software-Based Systems—Part 2," Jan. 11, p. 100 Rashkow, Bertram R.—"Reducing Electrical Noise," Jan. 11, p. 108 Raudsepp, Eugene—"Are You Creative?" Feb. 22, p. 180 "Selling Your Ideas to Management," Mar. 8, p. 50
"The Nitty-Gritty of Creativity," Apr. 12, p. 86
eger, James—"Trimming Transducer Signals," Rieger, James—"Trimming Transducer Signals," July 26, p. 110 Rife, D. F.—"Keeping Engineering Costs in Line," June 7, p. 84
"How Design Decisions Affect Inventory," Nov. 8, p. 84 Rouverol, William S.—"Attacking Gear Noise at the Mesh," May 10, p. 68

St. John, Richard C.—"Short Cut for Designing Helical Springs." Nov. 22, p. 92
Saylor, D. K., R. E. Shepler and M. K. Towne—"Carbon-Fiber Composites," May 24, p. 88
Schanker, Jacob Z.—"Finding Wire Diameter Without Tables," Apr. 12, p. 111
Schmidt, Wayne—"Space-Saving Design with Thin-Section Bearings," June 7, p. 72
Schneider, Stanley—"The Growing Family of Solid-State Relays," Aug. 9, p. 93
Schubert, Frank—"Determining Optical Mirror Size," Jan. 25, p. 128
"Determining Spring Diameter Changes," Apr. 26, p. 228

Size, "Jan. 20, p. 125

"Determining Spring Diameter Changes," Apr. 26, p. 228

Schwerdlin, Howard—"Reaction Forces in Elastomeric Couplings," July 12, p. 76

Seneczko, Myron—"Selecting Transmissions for Mobile Equipment," Aug. 9, p. 86

"Bearings That Succeed Where Others Fail," Oct. 11, p. 72

Shamir, Harry A.—"Simple Method for Designing Split Shaft Collars," Dec. 6, p. 122

Shepler, R. E., M. K. Towne, and D. K. Saylor—"Carbon-Fiber Composites," May 24, p. 88

Sinko, Michael J.—"Simple Sensors That Need No Power," Apr. 26, p. 154

Skaistis, Stanley J.—"New Techniques Muffle Hydraulic Noise," Mar. 22, p. 120

Slaughter, Elmer—"Locating Coil and Winding Failures," July 26, p. 135

Soltis, Lawrence A. and Robert Ebisch—"Making Continuing Education Pay Off." Jan. 25, p. 100

Spotts, M. F.—"Bolt-Hole Tolerances," June 21, p. 114

"Finding Angles of Intersecting Planes," Nov. 22, p. 113

Strasser, Federico—"Fastening Without Fasteners," p. 113
Strasser, Federico—"Fastening Without Fasteners,"
Jan. 11, p. 105
"Self-Jigging Joints for Brazing," Apr. 26, p. 224
"Designing Hardened Steel Parts," Oct. 25, p. 138
"Designing for Assembly," Nov. 22, p. 115
Sullivan, J. L.—"Fatigue Life Under Combined
Stress," Jan. 25, p. 125

Sullivan, James M.—"The Case for Special Bearings," Apr. 26, p. 218
Sutcliffe, Todd and Alan Protheroe—"New Hydraulic
Fluids Kick the Petroleum Habit," Jan. 25, p. 120
Swenson, William E. and Arthur S. Kasper—
"Ending the Abuse of Young's Modulus," July 12, p. 80 p. 50 zews, A. P.—"The Engineer as Technical Expert," July 26, p. 106

### T

Tako, Sandor L.—"Understanding DC Servoamplifiers: Part 1—Basic Operation," May 10, p. "Understanding DC Servoamplifiers: Part 2—Transistorized Amplifiers," May 24, p. 96
"Understanding DC Servoamplifiers: Part 3—Selection Guide," June 7, p. 83
Teschler, Leland—"Storing Data with Holograms," Jan. 11, p. 105
"New Circuit Boards Beat Heat and Vibration," Len 25, p. 105 Jan. 25, p. 105
"Coming: New Generations of Microcomputers." "Coming: New Conservations of Microcomputation, Mar. 22, p. 108
"Batteries Find a Niche on the Circuit Board," May 10, p. 75
"Transducers for Digital Systems," July 12, p. 64 "Legislating the Way to Innovation," Sept. 20, p. 159 "Minicomputers That Act Like Mainframes," Oct. "Minicomputers That Act Like Mainframes," Oct. 22: p. 118
22: p. 118
23: p. 12: Sequest for Simple Software," Dec. 6, p. 40
"The Quest for Simple Software," Dec. 6, p. 143
The berge, John E. and Mark P. Wolverton—
"Reinforced Thermoplastics That Fight the Cold," Apr. 12: p. 90
Tomeo, Ben—"Avoiding Hidden Tolerances in True
Position Dimensioning," May 24: p. 110
Toorens, H. and C. Gignen—"Understanding FET
Probes," June 21, p. 132
Tottingham, Roy—"Understanding Logic Analyzers," Apr. 12: p. 99
Towne, M. K., D. K. Saylor and R. E. Shepler—
"Carbon-Fiber Composites," May 24: p. 88

Vollaro, Joseph F.—"Quick and Easy Perspective Drawings," May 24, p. 105

### W

Weber, Theodore, Jr.—"Simplifying Complex Cam Design," Mar. 22, p. 115
White, Carl B.—"Controlling Force with Torque Motors," Oct. 11, p. 86
Wise, Clare E.—"AUTOMOBILES: New Vigor for an Endangered Species," Feb. 22, p. 26
"GMs Front-Drive X Cars," Apr. 26, p. 22
"Will the Wing Car Fly at Indy," May 10, p. 24
"Gentlemen, Change Your Motors," Aug. 9, p. 21
"Gasohol Consumption Skyrockets," Oct. 25, p. 28
"A Fight to Save the "Full-Size Car," Dec. 6, p. 24
Wolverton, Mark P. and John E. Theberge—
"Reinforced Thermoplastics That Fight the Cold,"
Apr. 12, p. 90 Apr. 12, p. 90
Wyland, A. D.—"Prototype Solenoid Actuators," Oct. 25, p. 134

York, J. R.—"Selecting High-Torque Hydraulic Motors," Aug. 23, p. 78

Z Zacherl, Louis-"Protecting Electric Motors," Feb. 8, 2acherr, Louis— Protecting Sheetric Motors, rec. 5, p. 182
Zanker, Adam—"Air-Cooled Heat Exchangers," Dec. 6, p. 158
Zimmerman, Mark D.—"New Technology Protects
Skiers From Themselves," Jan. 11, p. 20
"Shuttle Status," Feb. 8, p. 20
"The Big Boom in Engineer Salaries," Feb. 22, p. The Big Boom in Engineer Salaries, Feb. 22, p. 148
"Innovations in Farm Equipment," Mar. 8, p. 18
"From Concept to Cornfield in Record Time," Apr. "From Concept to Corntield in Record Time," Apr. 26, p. 40
"FARM MACHINERY: Tools of Sustenance & Survival," May 24, p. 18
"Strategic Planning: Tapping the Engineer's Know-How," Aug. 9, p. 66
"Engineering the Future of America," Sept. 6, p. 24
"Planners Attack the Employment Cycle," Sept. 20, p. 130
"New Focus for Loyalty," Sept. 20, p. 146
"Make Time Your Ally, Not Your Enemy," Oct. 25, p. 108 p. 108 "New Troop Carrier Fights Like a Tank," Nov. 22,

# SUBJECT INDEX



# - ELECTRICAL & ELECTRONIC

### SUBJECT CLASSIFICATION KEY

- Article

DIA - Designers In Action

E&E - Electrical & Electronics Ref. Issue

F&J Fastening & Joining Ref. Issue

FP Fluid Power Ref. Issue

M Materials Ref. Issue Mechanical Drives Ref. MD

Issue

N/T - News Trends S Scanning

### 11. Motors & Electromechanical Actuators

Electronics in the News, E&E, 5/17, p. 2 Motors, E&E, 5/17, p. 7 Gentlemen, Change Your Motors! A, 8/9, p. 21 Saving Energy with Shaded-Pole Motors, A, 7/12, p.

Controlling Force with Torque Motors, A, 10/11, p. 86 Helical Armature Speeds Solenoid Response, S, 4/26, p. 54 Prototype Solenoid Actuators, A, 10/25, p. 134 Locating Coil and Winding Failures, A, 7/26, p. 135

### 12. Motor Controls & Protectors

Motor Controls and Protectors. E&E, 5/17, p. 81
Cost of Energy-Efficient Motor Drive Halved, N/T, 10/25, p. 8
Understanding DC Servoamplifiers: Part 1—Basic Operation, A, 5/10, p. 72
Understanding DC Servoamplifiers: Part 2—Transistorized Amplifiers, A, 5/24, p. 96
Understanding DC Servoamplifiers: Part 3—Selection Guide, A, 6/7, p. 83

### 13. Switches & Relays

Switches and Relays, E&E, 5/17, p. 113 New Directions in Switch Design, A, 3/8, p. 72 Low-Pressure Air Takes the Shock Out of Switching,

S, 4'26, p. 62 Indicator Lamp Changes Color to Display Signal Levels, S, 6'7, p. 32 The Growing Family of Solid-State Relays, A, 8/9, p.

93 Eye-Controlled Switch Regulates Wheelchair Movement, S, 9'20, p. 42 Inertia Switch Regulates Rocket Fuse, S, 10'25, p. 42

### 14. Circuit Components

Solid-State Switching Devices, E&E, 5/17, p. 189 Reliable Microcircuit Packages, A, 11/8, p. 114 Magnetic Fluid Protects Sliding Contacts, S, 11/22, p. 40

Storing Data with Holograms, A, 1/11, p. 90
Storing Data in Magnetic Bubbles, A, 3/8, p. 60
Coming: New Generations of Microcomputers, A, 3/22, p. 108
Wall Encoding Quadruples Storage Density of Bubble Devices, N/T, 5/10, p. 8
Chips That Chirp, Whistle, and Buzz, A, 11/22, p. 108
Simple Inductor Forms Tuned Circuit, S, 4/12, p. 58
Trimming Transducer Signals, A, 7/26, p. 110
Two Chips Convert TV Receiver into Data Terminal, N/T, 9/6, p. 8
Laser Helps Assemble Smoke Detectors, N/T, 1/11, p.

er 'Sees' Latent Prints Not Revealed by Dusting,

Staining, N/T, 5/24, p. 12
Most Powerful ar Being Constructed, N/T, 6/21, p. Laser 'Snapshots' Analyze Chemical Reaction, N/T,

7/12, p. 18
Shiva Laser Achieves High Fuel Compression, N/T,
7/26, p. 8
Laser Tone Arm' Tracks Pitted Audio Disc, S, 9/6,

p. 36
The Promise of Integrated Optics, A, 12/6, p. 143
Turning Acoustic Signals into Optical Images, A, 12/6, p. 167
PC Lamp Mounts Two Ways, S, 11/22, p. 40

### 15, 16. Miscellaneous Components. Interconnections

Niobium-Tin Coil for Huge Superconducting Mag-

net, NT, 920, p. 4 Reducing Electrical Noise, A, 1/11, p. 108 Semiconducting Sleeve Minimizes Insulator Break-downs, S, 5/24, p. 64 Extruded Thermistor Forms Self-Regulating Heat, S,

Extruded Thermistor Forms Self-Regulating Heat, S, 10/11, p. 38
Protecting Electric Motors, A, 2/22, p. 182
Potermining Optical Mirror Size, A, 1/25, p. 128
Fiber Optics Detect Fabric Flaws, S, 2/8, p. 36
Large-Scale Optics Trim Light Bills, A, 4/12, p. 108
Polarizing Filters Plot Analog Waveforms, S, 7/26, p.

62 Ball-Point Connector Aligns Optical Fibers, S, 7/26,

p. 04 Optic Bar Simplifies Office Copier, S, 10/11, p. 34 Simplified Optical Design, A, 11/8, p. 113 Ferrite Cladding Lowers Antenna Profile, S, 5/24, p.

63
Interconnections, E&E, 5'17, p. 251
Solderless Connector Secures Leadless Chip Carriers, S. 1711, p. 48
Crimp Connector Keeps Semiconductors Cool, S, 11/8, p. 36
Folding Plug Cuts Assembly Time, S, 11/8, p. 38
Flexible Wire Filters Interference, S, 11/22, p. 44
New Circuit Boards Beat Heat and Vibration, A, 1/25, p. 109

1/25, p. 105

Modular Components Speed Control Panel Assembly, S, 1/25, p. 56

Press-On Breadboard System Pushes Prototype Assembly, S, 5/24, p. 60

### 17. Control Systems & Computers

Machine Controllers, E&E, 5/17, p. 213 Setting Back the Thermostat Tested in Real Homes, N/T, 4/26, p. 10

Developing Software for Micro Applications, A, 2/8, p, 66 Random Numbers with Software, A, 2/8, p, 76 Finding Hardware Faults with Software, A, 2/22, p. Finding Hardware Faults with Software, A. 2.22, p. Software for Stepping Motors, A. 4/26, p. 213
Software farts' Easy to Debug, A. 4/26, p. 213
Software That's Easy to Debug, A. 4/26, p. 227
Auxiliary Micro Makes Spectrum Analyzer Easy to
Use, S. 6/21, p. 66
Software for Faster Contouring, A. 6/21, p. 119
First Microprocessor Control for Home Heating/Air
Conditioning, N.T. 7/26, p. 10
Array Processors, A. 8/23, p. 87
Costs for Applying Microcomputers Called Totally
Unrealistic, N.T. 10/11, p. 6
Minicomputers That Act Like Mainframes, A. 10/25, p. 118
The Quest for Simple Software, A, 12/6, p. 40
Computer Aids Roller Coaster Design, N.T. 5/24, p. 4
Computer to Help Train Olympic Athletes, N.T. 7/12, p. 6

p. 6 Show and Tell on a CRT, A, 12/6, p. 47 Printer Beams Images at Paper, N/T, 1/25, p. 10 Charged Glass Directs Ink Jets, S, 3/8, p. 44 Thick\_Film Head Speeds Thermal Printing, S, 5/10,

Snap-On Bobbins Simplify Print Head Assembly, S, 89, p. 42 159 Pages Printed Each Minute, N/T, 8/23, p. 10 Terminal Beams Data to Computer, N/T, 12/6, p. 8 Hand-Held Machine Speaks Four Languages, N/T, 6/21, p. 8

### 18. Power Supplies, Conditioners & Controls

Battery Tapper Extends Vehicle Range, S, 1/11, p. 46 Redox Battery Promising to Store Energy Cheaply, N/T, 4/26, p. 6 Batteries Find a Niche on the Circuit Board, A, 5/10, p. 75 Zinc-Nickel Battery Looks Good for EVs, A, 10/25, p.

Determining Total Power-Supply Error, A, 6/21, p. Due in 1983: First Commercial Superconducting Generator, N/T, 3/8, p. 6
Superconducting Coil Best Bet for Energy Storage,
N/T, 12/6, p. 6

# 19. Instrumentation

Instrumentation in Product Design, A, 9'6, p. 78
Venturi Probe Monitors Combustion Gas Temperature, S. 1'25, p. 58
Stretched Film Relaxes Under Light, S, 4'26, p. 56
Thin-Wall Cylinder Forms Aircraft Altitude Sensor,
S, 4'26, p. 61
Simple Sensors That Need No Power, A, 4'26, p. 154
Understanding FET Probes, A, 6'21, p. 132
Transducers for Digital Systems, A, 7'12, p. 64
Microwave System Senses Plastic Mines, S, 8'23, p.
44

44 Cable Winder Forms Electrical Coupler, S, 8/23, p. 48 Applying Weight-Sensing Transducers, A, 8/23, p. 82 Greater Precision for Noncontact Sensors, A, 12/6, p.

117
Robot Sees What It's Picking Up, N/T, 6/21, p. 6
Reflected Light Pinpoints Part Dimensions, S, 7/12,

p. 40 Radiation Monitor Measures Wear Where It Hap-pens, S. 12/6, p. 58 Supporting Software-Based Systems: Part 1—Software-Design Instrumentation, A, 1/11, p. 100

100 Understanding Logic Analyzers, A, 4/12, p. 99 Instant Replay for Vibration Analysis, A, 11/22, p. 87 Wooden Trestle: Key Element in Nuclear-Blast Simulator, A, 5/10, p. 10



# 2 - FLUID POWER

### 21, 22, 23. Fluids, Fluid Conditioners, Fluid Conductors

Hydraulic Technology Stacks Up Gains in Power and Precision, A. 1/11, p. 84 Fluid Handling Components, FP, 9/27, p. 261 New Hydraulic Fluids Kick the Petroleum Habit, A. 1/25, p. 120 Hardware and Water-Based Hydraulic Fluids, A, 7/26, n. 120 Hardware and Water-Based Hydraulic Fluids, A, 7/26, p. 120
Fluids, FP, 9/27, p. 128
Hydraulic and Pneumatic Filters, FP, 9/27, p. 131
Reservoirs, FP, 9/27, p. 18
Float Valve Blocks Contaminated Fuel, S, 5/10, p. 42
Computer Models Optimize Filter Selection, A, 5/24, p. 100 p. 100 Filter Unit Manufactures Its Own Medium, S, 10/11, p. 36 Air-Cooled Heat Exchangers, A, 12/6, p. 158 Selecting Compressed-Air Dryers, A, 4/26, p. 164 New Techniques Muffle Hydraulic Noise, A, 3/22, p. New Techniques Muffle Hydraulic Noise, A, 3/22, p. 120 Conductors, Fluids, and Conditioners, FP, 9/27, p. 121 Air-Powered Piston Propels Aerosol Spray, S, 12/6, p.

### 24. Linear Devices

Cylinder Controls Itself, S, 2/8, p. 38 Double-Wall Cylinder Eliminates Tie Rods, S, 3/8, p. Double-Wall Cylinder Fullmanner 1. The Act of Switch Senses Cylinder Position, S, 8/9, p. 40 Cylinders, FP, 9/27, p. 181 Accumulators, FP, 9/27, p. 181 Accumulators, FP, 9/27, p. 19 Boosters, FP, 9/27, p. 12 Solar-Powered Hydraulic System Follows the Sun, S, 8/9, p. 36 Precision Pumping, A, 2/22, p. 165

### 25. Rotary Devices

Power Actuators and Shock Absorbers, FP, 9/27, p. Power Actuators and Shock Absorbers, FP, 9:27, p. 175
Auxiliary Impeller Seals Process Pump. S, 3/8, p. 40
Power Input and Storage Devices, FP, 9:27, p. 9
Hydraulic Pumps, FP, 9:27, p. 9
Positive-Displacement Pumps, FP, 9:27, p. 262
Centrifugal Pumps, FP, 9:27, p. 264
Sliding Gear Shifts Pump Capacity, S, 12/6, p. 54
Hydraulic Muscle Powers High-Torque Tapper, S, 12/6, p. 60
Selecting High-Torque Hydraulic Motors, A, 8/23, p. 78 78
Motor Readied for Seawater Hydraulic System,
N.T. 920, p. 6
Compressors, FP, 9/27, p. 20
Vacuum Pumps, FP, 9/27, p. 31
Rotary Actuators, FP, 9/27, p. 186

### 26. Seals

Exclusion Devices, MD, 6/28, p. 246
Circumferential Seals, MD, 6/28, p. 247
Slanted O-Rings Extend Shaft Life, A, 28, p. 77
O-Rings for Low-Pressure Service, A, 4/12, p. 94
Face Seals, MD, 6/28, p. 239
Radial Lip Seals, MD, 6/28, p. 248
Felt Radial Seals, MD, 6/28, p. 256
Diaphragm Seals, Life, Contamination Resistance, FF, 9/27, p. 2
Leaking Seals: A Growing Problem, FP, 9/27, p. 7
O-Rings and Other Squeeze Packings, FP, 9/27, p. 231
Exclusion Seals, FP, 9/27, p. 244
Face Seals, FP, 9/27, p. 244
Face Seals, FP, 9/27, p. 244
Face Seals, FP, 9/27, p. 245
Sommetalic Cansket Materials, A, 10/25, p. 124
Nommetalic Cansket Materials, A, 10/25, p. 124
Oompression Packings, MD, 6/28, p. 250
Lip Packings, MD, 6/28, p. 251
Compression Packings, MD, 6/28, p. 254
Compression Packings and Seals, FP, 9/27, p. 233
Pressure-Energized Seals, FP, 9/27, p. 238

### 27. Valves

Power Modulation and Control Devices, FP, 9/27, p. 55
Putting Valves in Circuits, FP, 9/27, p. 64
Fluid-Handling Valves, FP, 9/27, p. 286
Momentary Contact Reverses Solenoid Valve, S, 3/22, p. 56
Saving Energy in Filot-Operated Valve Systems, A, 4/26, p. 226
Leaky Threads Restrict Gas Flow, S, 6/7, p. 36
Spinning Nozzle Keeps Grain Dust Under Control, S, 6/7, p. 38
Air Burst Meters Alloy Pastes, S, 11/22, p. 44

### 28. Instruments & Controls

Tuning Fork Monitors Engine Efficiency, N/T, 4/12, p. 54 Plastic Bourdon Tube Simplifies Pressure Gage, S, Plástic Bourdon Tube Simplifies Pressure Gage, 5, 5/10, p. 42.
Gages and Meters, FP, 9/27, p. 66
Tandem Floats Tell Liquid Level, S, 11/8, p. 34
Pneumatic Pressure Regulators, FP, 9/27, p. 63
Pneumatic Controls Mount on PC Board, S, 7/12, p. 36
Fluid Logic and Controls, FP, 9/27, p. 279
Essigning Pneumatic Controls, A, 10/11, p. 92
Air vs. Electrical Logic, A, 11/8, p. 108

### 29. Systems & Assemblies

Precision Hydraulics Take On Rugged Jobs, A, 6/7, p. Power Units, FP, 9:27, p. 16
Microcomputers Monitoring Mobile Hydraulic Systems, NIT, 10, 6
Controlling Noise in Hydrostatic Transmissions, A, 1021, p. 13
Long Life for Hydrostatic Transmissions, A, 9:6, p. 96
Hydrostatic Drives, FP, 9:27, p. 178
Auxiliary Transmission Keeps Tractor-Trailers RollTop 18:50, p. 4
Temporary Transmission Responsible Transmissions, A, 9:12, p. 16:50, p. 4
Temporary Transmission Responsible Transmission Responsib 56 Airfoil Atomizer Can't Clog, S, 9/6, p. 40



# 3 - MECHANICAL

### 31. Power Sources

Mechanical Components in the News, MD, 6/28, p. 2 Jet Engine Gets Computerized Control, N/T, 10/11, p. 8
Engines, MD, 6/28, p. 68
FFFF Test Reactor Readied for Summer Startup,
N/T, 4/12, p. 8
Fusion Power: We'll Have It if Money Can Buy It, A,
4/26, p. 30

4/28, p. 30 ogen Fuel from Biomass Wastes? N/T, 1/11, p. 4
Germans to Test Substitute Engine Fuels, N/T, 7/12,

p. 6 New Additive Looking Good as Octane Booster for the 1980s, N/T, 8/9, p. 18 Peat Power: Fuel by the Bog, A, 10/11, p. 20

Gasohol Consumption Skyrockets, A, 10/25, p. 28 College Unveils Big Wind Turbine, N/T, 1/11, p. 26 Indian Village First with Total Solar Power, N/T, 1/11, p. 36 Frigid-Climate Building Gets Solar Heating/ Cooling, N/T, 1/25, p. 4 Controlled Air Currents Drive Rotary Windmill, S, Controlled Air Currents Drive Rotary Windmill, S. 2/22, p. 64
Let Sunshine Heat Your Water? N/T, 4/26, p. 18
Black Liquid Heated by New Solar Collector, N/T, 5/24, p. 8
Nested Panels Form Solar Water Heater, S, 5/24, p.

Solar Boilers Get Hot, A, 7/12, p. 20 Sea-Going Turbine Harnesses Wave Energy, S, 7/12, Sea-Going Turbine transcent p. 34 First Solar Coal Gasification Tests Yield Promising Results, N/T, 726, p. 16 New Solar to Electrical Energy System, N/T, 8/9, p. 6 Largest Solar Photovoltaic Power Station Activated, N/T, 9/20, p. 23 Concept OKed; Hardware Facing Tests, N/T, 10/11, p. 12. Test Site Picked for Cluster of Largest Wind Turbines, N/T, 11/22, p. 6 Simplicity Means Economy for Windmill Design, DIA, 12/6, p. 134 Striling Engine Goes Commercial, A, 2/8, p. 26 Coming: Time-of-Day Electric Rates, N/T, 6/21, p. 10

### 32, 33, 34. Drives, Transmissions, **Drive Components**

Tooth Profile Beefs Up Belt Drive, S, 2/22, p. 64 Compact Speed Reducer Rides on Pins, S, 2/22, p. 61 Adjustable-Speed Drives, MD, 6/28, p. 7 Selecting Transmissions for Mobile Equipment, A, 8/9, p. 86

Traction Drive to Threaten Gears? N/T, 9/6, p. 6 Chains, MD, 6/28, p. 28 Narrow V-Belts, A, 1/25, p. 116 Belt Drives, MD, 6/28, p. 100 Stainless Forms Durable Drivebelts, S, 8/9, p. 38 Perforated Tape Raises Car Windows, S, 9/6, p. 38 Attacking Gear Noise at the Mesh, A, 5/10, p. 68 Cale Programs Find Gear Geometry, A, 5/10, p. 80 Gears and Gear Drives, MD, 6/28, p. 15 Solving Gear Center Distance Equations, A, 9/6, p. 103 Crossed Rollers Form Flexible Convexes Chain

103
Crossed Rollers Form Flexible Conveyor Chain, S, 126, p. 60
Self-Aligning Idler Keeps Conveyor Belts on Track, S, 67, p. 34

### 35. Rotational Components

Bearings, MD, 6/28, p. 143 Bearings That Succeed Where Others Fail, A, 10/11, p. 72 Coming Soon: Practical Ceramic Bearings, A, 3/8, p.

The Case for Special Bearings, A, 4/26, p. 218
Space-Saving Design with Thin-Section Bearings, A, 67, p. 72
Rolling-Element Bearings, MD, 6/28, p. 163
Premounted Bearings, MD, 6/28, p. 176
Specialty Bearings, MD, 6/28, p. 179
Plain Bearings, MD, 6/28, p. 146
Sliding-Bearing Materials, MD, 6/28, p. 152
Sputtered Coatings for Gas Bearings, A, 8/9, p. 96
Couplings, MD, 6/28, p. 51
Universal Joints, MD, 6/28, p. 53
Reaction Forces in Elastomeric Couplings, A, 7/12, p. 76
Lightweight Brake Relies on Double-Duty Rotor, S,

76 Lightweight Brake Relies on Double-Duty Rotor, S, 3/22, p. 54 Failsafe Brakes, A, 4/26, p. 170 Clutches and Brakes, MD, 6/28, p. 37 Comparing Blowers, FP, 9/27, p. 22

### 36, 37. Mechanisms, Controls

Where the Mechanical Way Still Makes Sense, A,

Auxiliary Components, MD, 6/28, p. 59 Simplifying Complex Cam Design, A, 3/22, p. 115 Painless Analysis of Four-Bar Linkages, A, 7/26, p.

124
Calc Program Sizes Cylinder-Crank Linkages, A., 126, p. 166
Maintaining Ball Screw Precision, A., 4/12, p. 105
Predicting Wear in Misaligned Rolling Contact, A., 7/26, p. 128
Self-Energized Governor Limits Shaft Speed, S. 3/22, p. 60

p. 60 Electrical Ball Governor Senses Power Loss, S, 11/22,

### 38. Subsystems

Drain Kit Speeds Engine Oil Changes, S, 4/26, p. 58 Variable Orifice Balances Lubrication Pressure, S, 67, p. 36 Lubricants, MD, 6/28, p. 197 Lubricating Systems, MD, 6/28, p. 206 Multipurpose Robot Goes to Work, N/T, 1/25, p. 8 Robots Start to Get Sensible, A, 3/22, p. 44



# 4 — ASSEMBLY COMPONENTS

### 41, 42, 43. Fasteners, Springs & Isolation Devices, Misc.

Materials, F&J, 11/15, p. 77
Special-Purpose Fasteners, F&J, 11/15, p. 127
Nuts and Inserts, F&J, 11/15, p. 23
Tapered Rings Lock Hub to Shaft, S, 4/26, p. 61
Retaining Rings, F&J, 11/15, p. 100
Simple Method for Designing Split Shaft Collars, A, 12/6, p. 122
Flush Finish Provided by Self-Piercing, Self-Clinching Rivet, NT, 11/8, p. 8
Rivets, F&J, 11/15, p. 95
Bleeding Bolts Signal Fatigue Failure, S, 1/25, p. 54
Hydraulic Bolt Preloads Propellers, S, 3/22, p. 58
Bolt-Hole Tolerances, A, 6/7, p. 88

Tapped-Hole Tolerances, A, 6/21, p. 114
Bullet-Nosed Toggle Bolt Installs With a Hammer,
A, 9/20, p. 42
Saving Weight in Bolted Joints, A, 10/25, p. 128
Demand Rising for Fasteners Precoated with Adhesive, F&J, 11/15, p. 4
Wooden Fasteners for the Air Force, F&J, 11/15, p. 7
Self-Locking Fastener is Key to New Helmet Design,
F&J, 11/15, p. 38
Bolts, Screws, and Studs, F&J, 11/15, p. 11
Bonded Washer Relieves Honeycomb Stresses, S, 11/8, p. 38

11/8, p. 38
Welded Fasteners, F&J, 11/15, p. 34
Determining Spring Diameter Changes, A, 4/26, p. 228
Short Cut for Designing Helical Springs, A, 11/22, p.

92 Severe Vibrations Damped by Temperature-Tailored System, N.T. 3'22, p. 8 Shock Absorbers, FP, 9'27, p. 192 Rubber 'Springs' Cushion Heavy Loads, S, 6'21, p. 62

Short Cuts for Designing Belleville Springs, A, 2/22, p. 156
Improved Power Springs Provide More Muscle, A, 11/8, p. 89
Fighting Rolling Resistance in Tires, A, 1/11, p. 30
Boots and Way Covers, A, 2/8, p. 61

### 44. Measurement Equipment

Compressible Film Checks Fit of Mating Parts, S,

Compressible Film Checks Fit of Status, 21/25, p. 36
Displaced Water Pinpoints Poisson's Ratio, S, 4/12, p. 60
Photography Reveals Surface Changes, S, 5/10, p. 44
Krypton Gas Detects Surface Microflaws, A, 8/9, p. 97
New Services for Calibrating Ultrasonic Test Systems, A, 9/6, p. 101
Ultrasonic Grating Checks EB Welds, S, 11/22, p. 42



# 5 - MATERIALS

### 51, 52. Metals

ASM Sees Problems But No Shortages, N/T, 1/25, p. 10
Materials in the News, M, 3/15, p. 2
Ferrous Metals, M, 3/15, p. 9
Galvanized Sheet Debuts as Solar Collector, N/T,
4/12, p. 6
HSLA Bar Steel for Lighter, Stronger Parts, A, 8/23, p. 93 New Steel for Auto-Body Panels, N/T, 9/6, p. 8 No Tin in Tin-Can Car Parts for Tomorrow, N/T, 9/6,

Designing Hardened Steel Parts, A, 10/25, p. 138 Stainless Roof Floats on a Cushion of Air, S, 9/20, p.

40 Improved Process Sought for High-Nitrogen Stain-less Steel, N/T, 12/6, p. 16 Nonferrous Metals, M. 3/15, p. 77 ASM Warned of Metals Shortage Danger, N/T, 6/21,

ASM Warness School of the A. 2/8, p. 79
Aluminum PM Update, A. 2/8, p. 79
Copper Particles Form Fluid Contact, S. 7/26, p. 66
Refractory Hard Metals, M. 3/15, p. 256
Metals That Remember, A. 10/25, p. 113

### 53, 54. Plastics, Rubber & Elastomer

Plastics, M. 3/15, p. 119 NPE 79: Largest Show Yet Staged by U.S. Plastics Industry, NT. 6/7, p. 8 Plastics that Stop EMI, A. 7/26, p. 114 New Polystyrene Resin for UL-Rated Structural Foam Parts, N/T, 3/8, p. 10 Energy-Saving Roof Goes On Quickly, N/T, 4/26, p. 8 Special Bearing Designed for Vehicles with Front-Wheel Drives, N/T, 7/12, p. 12 Nylon Inserts Cut Honing Stresses, S, 7/26, p. 68

### 1979 EDITORIAL INDEX

Plastics for the Tough Jobs, A, 9/6, p. 88 Snap-On Gutters Speed Assembly, S, 9/20, p. 44 Plastic Band Cuts Container Costs, S, 10/25, p. 49 Fine-Tuning the Engineering Thermoplastics, A, 11/22, p. 103 Reinforced Thermoplastics that Fight the Cold, A,

Reinforced Thermoptasucs that right with 2p, 90 Toughest Mineral-Reinforced Nylon May Win Lots of Jobs, NT, 5:10, p. 4 Plastics for Load-Bearing Parts, A, 5:10, p. 60 Catalyst Solves Florida's Humidity for Fiberglass-Car Builder, NT, 6:7, p. 12 Smooth, Ripple-Free Plastic Panels, A, 6:21, p. 108 Glass Fabric Dissipates Transformer Heat, S, 7:26, p.

64 Characterization of SMC Composites, A, 7/26, p. 133 Welded Tube Cutz Engine Component Costs, S, 6/21, p. 64 Natural Rubber Keepe Bouncing Back, A, 1/25, p. 110 Elastomers, Rubbers, M, 3/15, p. 221

### 55, 56. Joining Materials, Other Nonmetals

esigning for Assembly, A, 11/22, p. 115 al Still Flexible After 'Decades' of Accelerated Weathering, N/T, 2/8, p. 12

Adhesives Are Getting Stronger in Many Ways, A, 2'8, p. 54
Pen Carried in Pocket Dispenses Drop of Adhesive, Pen Carried in Pocket Dispenses Drop of Adhesive, Sealants, M. 6'28, p. 266
Anerobic Adhesive Holds Bearings, S. 8'23, p. 46
Sticky-Back Magnetic Tape to Solve Many Problems, F&J, 11/15, p. 2
Pen Carried in Pocket Dispenses Drop of Adhesive, F&J, 11/15, p. 8
Carbon, M. 9'15, p. 243
Engineering Ceramics, M. 3'15, p. 245
Glass, M. 3'15, p. 254
Dark-Glass Auto Roof Clears at Night, N/T, 6'21, p. 10

Dark-transcient 10 10 Fibers, M. 3/15, p. 247 Temperature Drop Improves Insulation Efficiency, S. 2/22, p. 62 Viscoelastic Layer Quiets Helicopter, N/T, 9/20, p. 12 Rubber Desiccant Won't Corrode, S, 3/20, p. 46

### 57. Finishes, Coatings & Lubricants

Finishes That Fight Corrosion, A, 11/8, p. 96 New Process for Plating Decorative Small Parts, N/T, 9/20, p. 4

Ultrathin Iron Foil Electrodeposited Economically, N/T, 10'25, p. 12 Silent Buzzer Tells Plating Problems, S, 11'8, p. 40 Paint Submerged Surface? It's Been Done, N/T, 2'8,

Paint Submerged Surfaces 11 s a seed.

p. 4

New Paint System Looking Good at Stopping Corrosion, N/T, 3/22, p. 4

Urethane Touted as 'Baked Enamel' for Structural Foam, N/T, 1/11, p. 12

Electrostatic Powder Coatings Becoming Popular 'Paints,' N/T, 7/26, p. 12

Colored Polymers Deposited as Films, N/T, 11/8, p. 6

Understanding Antirust Chemistry, A, 7/12, p. 58

### 58. Prefabricated Forms

Ford's Composite LTD: No Steel at \$3.5 Million, N/T. 3/22, p. 10
Carbon-Fiber Composites, A, 5/24, p. 88
Injection-Molded, Carbon-Fiber Composites, A, 8/9,

stomizing Carbon-Fiber Composites, A, 12/6, p.

Steel Tubing Forms Machine Tool Frame, S. 5/24, p.

63
Tubing Performance Boosted by Internal Fins, N/T, 8/9, p. 4 Braided Rope Splices Quickly, S, 9/20, p. 46



# 6 — MANUFACTURING PROCESSES

### 61, 62, 63. Metal Casting, Shaping, Forming

Prototyping Investment Castings, A, 6/7, p. 93 Miniature Zinc Die Castings, A, 3/22, p. 103 PM Link Readied as Jet-Engine Hardware, N/T, 11/8, p. 10 Fastening Without Fasteners, A, 1/11, p. 105 Taking Sheet Metal to the Limit, A, 2/22, p. 170 GCA Tips Off Sheet-Metal Formability, N/T, 4/26, p. 12 Guidelines for Stampings, A, 4/26, p. 159

### 64, 65. Metal Joining, Removal

Joining Techniques, F&J, 11/15, p. 161 Huge Assembly to Weld Soviet Nuclear Pressure Vessel, N/T, 12/6, p. 10 Computerized Laser Welding Relay Terminals, F&J, 11/15, p. 4

Self-Jigging Joints for Brazing, A, 4/26, p. 224 Ceramic Sandwich Formed by Active Metal Brazing, F&J, 11/15, p. 7 Water Jet Cutting Nonmetals, N/T, 4/12, p. 4

### 66. Metal Treating

Faster Carburizing with a Plasma, A, 1/25, p. 128
Porosity Sealed Out of High-Temperature Castings, N/T, 2/22, p. 18

### 67, 68. Finishing, Plastics & **Rubber Processes**

Sputtering Comes Out of the Clean Room, A, 1/11, p Conforming Tank Electroplates Damaged Parts, S, 7/12, p. 36 Decorating Thermoformed Parts, A, 3/22, p. 128 Freeze-Cutting Forms Pile Seals, S, 7/26, p. 66

### 69. Production Machinery & Plant Equipment

Modular Tooling Speeds Terminal Assembly, S, 1/11,

p. 52 Solder Nozzle Simplifies PC Repairs, S. 7/12, p. 38 Simple Cover Shrouds PC Tester, S. 11/8, p. 36 Selecting Drill Bushings, A. 3/22, p. 127 Speed Wrench Fits in Tight Spots, S. 4/12, p. 58 Gritty Bristles Produce a Smooth Finish, S. 6/21, p.

Gritty Bristies Fronts.

52 Clamp Speeds Pipe Repair, S, 7/12, p. 38
Plastic Hammer Tames Tough Fastening Jobs, S, 126, p. 56
Air-Purifying Helmet Protects Against Fumes, Mists, and Dusts, N/T, 7/12, p. 8



# -DESIGN THEORY & TECHNIQUES

### 71, 72, 73. Design Analysis & **Basic Science**

Fatigue Life Under Combined Stress, A, 1/25, p. 125 Stress Analysis on a Budget, A, 3/8, p. 66 An Alternative to the Stress-Strain Curve, A, 5/10, p.

Cutting Finite Element Cost, A, 5/24, p. 109 Ending the Abuse of Young's Modulus, A, 7/12, p. 80 Finding Deflections of Complex Beams, A, 10/11, p.

98 Finding Shear Stress in a Rectangular Beam, A, 10·25, p. 141 g Complex Parts, A, 11/8, p. 103 Stress Analyzing Complex Parts, A, 11/8, p. 103 Simplified Sider-Crank Equations, A, 4/12, p. 110 Finding the Length of Web Materials, A, 8/23, p. 97

Avoiding Jams During Assembly, A, 1/25, p. 130 Space Saving in Electrical Packaging, A, 8/9, p. 70 Reducing Disc-Assembly Problems, A, 3/8, p. 79 Finding Wire Diameter Without Tables, A, 4/12, p.

111
Screen Tests' for Product Designs, A, 4/26, p. 176
Simple Way to Predict Product Reliability, A, 8/9, p. 74

p. 74 Fitting Curves to Data, A, 9/6, p. 91

Calc Program Finds Inverse of an Involute, A, 3/8, p. 80 Calc Program Spaces Holes Around a Circle, A, 10/11, p. 100
Finding Angles of Intersecting Planes, A, 11/22, p. 113 Versatile New X-Rays Seen for First Time, N/T, 6/7, p. 4 Magnetic Heat Pump Shows Potential, N/T, 4/26, p. ntrolled Collisions in Space Proposed, N/T, 7/12, p.

Structures Studied for Platforms Built in Space, N/T, 10/11, p. 18
Controlling Galvanic Corrosion, A, 10/11, p. 78
Cosmic Rays Studied Deep in a Salt Mine, N/T, 1/11, p. 8 Kelp Farming Project Started, N/T, 3/8, p. 12 Some Bacteria Have Internal Compasses, N/T, 5/10,

Some Discertification and Parts for P. 16
Space Shuttle May Improve Replacement Parts for Humans, N/T, 10/11, p. 18
Ozone-Depletion Prediction Twice Earlier Estimate, N/T, 12/6, p. 10

75. Legal & Environmental

On Dry Land, Home Built for Fish, N/T, 1/25, p. 12 The Engineer as Technical Expert, A, 7/26, p. 106 Invention Abandonment and the Patent Law, A, 6/7,

p. 92 Avoiding the Pitfalls in Patent Procurement, A, 7/12, p. 54
Bill Would Speed Up Use of Government Patents,
N/T, 7/26, p. 12
Coping with Government Regulations, A, 7/12, p. 86



# 8 – ENGINEERING MANAGEMENT & OPERATION

### 81. Engineering Department Operations

Cost-Effective Design Changes, A, 2/8, p. 50 Managing the Engineering Interface, A, 8/23, p. 74 How to Run a More Efficient Department, A, 9/6, p.

74
Keeping Engineering Costs in Line, A, 5/24, p. 84
How to Handle the Problem Engineer, A, 6/7, p. 68
Combating Engineer Obsolescence, A, 4/26, p. 223
Down-to-Earth Advice for the New Manager, A, 5/10,

Down-to-Earth Advices of the Supervisory Posi-p., 56
Picking the Right Person for That Supervisory Posi-tion, A, 6/21, p. 104
The Mechanics of Management, A, 11/22, p. 82
The Big Boom in Engineer Salaries, A, 2/22, p. 148
Good Grades Pay Off in Higher Starting Salaries, N/T, 5/10, p. 12
Be Your Own Efficiency Expert, A, 3/22, p. 98
Make Time Your Ally, Not Your Enemy, A, 10/25, p. 108

Should You Make or Buy? A, 12/6, p. 112

# 84. Laboratory & Testing

ings, S, 6/21, p. 60

Testing New Products, A, 8/23, p. 96 Realistic Missions Flown in Simulation Laborato-ries, N/T, 11/8, p. 12 Predicting the Life of Mechanical Systems, A, 11/22,

Strategic Planning: Tapping the Engineer's Know-How, A. 8/9, p. 66
Preserving the Profit in New Product Development, A. 10/25, p. 140
Predicting Product Profitability, A, 4/26, p. 150
How Design Decisions Affect Inventory, A, 11/8, p. 84
Quick and Easy Perspective Drawings, A, 5/24, p. 105
Avoiding Hidden Tolerances in True Position Di-mensioning, A, 5/24, p. 110
Pushbutton Design and Drafting, A, 2/22, p. 160
Perspective Charts Produce 3-D Engineering Draw-ings, S, 6/21, p. 60

p. 96 Hyperbaric Chamber Tests Divers' Regulators, N/T, nyperiorne Chamber Tests Divers' Regulators, N/T, 1/11, p. 10 Duplicating One of Nature's Feats, N/T, 2/8, p. 18 Living-Room Furniture Combustibility Tested, N/T, 2/22, p. 8

### 85. Technical Information

p. 168 How to Write Reports that Won't be Ignored, A, 1/11, p. 76 Establishing an In-House Technical Library, A, 12/6,

### 87. Personal & Professional

Are Your Creative? A, 2/22, p. 180
The Nitty-Gritty of Creativity, A, 4/12, p. 86
Electro? 9 to Emphasize Microprocessors, N/T, 4/12, p. 10
Wescon/79, Sold Out for March 1997

p. 10
Wescon'79, Sold Out for Months, in San Francisco,
September 18-20, N/T, 9/6, p. 10
Design Show, Conference/East: A First' Starts Out in
Boston, N/T, 11/22, p. 8
Encouraging Registration Through an In-House
Program, A, 10/11, p. 66
Making Continuing Education Pay Off, A, 1/25, p.
100

100

Becoming Your Own Boss, A, 1/11, p. 107 Selling Your Ideas to Management, A, 3/8, p. 50 Engineering the Future of America, A, 9/6, p. 24

### 82, 83. Product Planning, Drafting & Reproduction

The Design Century: Producing More from Less, N/T, 8/9, p. 10



# 9 - MISCELLANEOUS

### 91. Complete Machines

Army Seeking Invulnerable Howitzer Hydraulics, NT, 292, p. 6 New Tropo Carrier Fights Like a Tank, A, 11/22, p. 18 Soviet Weapons May 'Outthink' Their U.S. Counter-parts, NT, 12/6, p. 12 Loopwheel Looks Good as Track Replacement, DIA, 12/6, n. 132

Loopwheel Looks Good as Track Replacement, DIA. 12/6, p. 13C circulates Molten Metal, S. 1/11, p. 50 MACHINE TOOLS: Cutting Edge of Technology, A. 1/25, p. 18 Machinery Fernanently Installed Before Shipment, NT, 28, p. 10 Standard Turbines to Deliver Power from Small

Dams, N/T, 2/22, p. 4

New Mower Manicures the Golf Course, N/T, 2/22, p. 18

Innovations in Farm Equipment, A. 3/8, p. 18
Jagged Rock, Holography, and Pop-Apart Building
Featured at Earthmover-Tire Proving Ground,
N/T, 4/12, p. 4
CONSTRUCTION EQUIPMENT: Moving the Earth

with Technology, A, 4/12, p. 18 com Concept to Cornfield in Record Time, A, 4/26, p.

FARM MACHINERY: Tools of Sustenance & Sur-

FARM MACHINERY: Tools of Sustenance & Survival, A, 524, p. 18
Clone Your Workshop for a Friend? N/T. 6/7, p. 6
BUSINESS MACHINES: Harnessing the Information Explosion, A, 6/21, p. 24
Flying Platform Attacks Fires in High-Rise Structures, N/T. /7/12, p. 4
Precision Chain Saw Cuts Gear Teeth, N/T, 9/6, p. 20
Grain Drill Sows Without Tilling, S, 9/6, p. 39
Tunneling Technology Goes to the Mines, DIA, 11/22, p. 28

Inverted Weir Skims Big Oil Spills, S, 11/22, p. 38 Three-Stage Toner Makes Crisp Copies, S, 2/8, p. 34 Nuc Com Sat Gets DoD OK, N/T, 5/24, p. 8 Magnetic Strip Automates Cassette Indexing, S, 6/7,

p. 34 HOME APPLIANCES: Improving the Good Life, A.

7/26, p. 24 Rotating Gates for Thames River, A, 8/9, p. 28 Rotating Gates for Thames River, A, 8/9, p. 28 Antenna Greatly Improves Mobile Communications, NT, 8/23, p. 8 Toward the "Do Everything" Business Machine, A,

12/6, p. 30 New Half Segment Tacked on Titan Booster, N/T, 1/11, p. 4 Shuttle Crews to Get Tasty, Varied Meals, N/T, 2/8, p.

Shuttle Status, A, 2/8, p. 20 Step Toward VSTOLs Flying from Small Ships, N/T, 2/22, p. 6

### 1979 EDITORIAL INDEX

AUTOMOBILES: New Vigor for an Endangered Species, A, 2/22, p. 26
Positioning Telescope Stabilizes Helicopter, S, 2/22,

p. 66 Service Hangar Slides and Folds Around DC-9, N/T,

3/8, p. 4 Stabilizer Wheels Keep Test Vehicles on Track, S, 3/8, p. 38 AEROSPACE: The Sky is Not the Limit, A, 3/22, p.

Occupants to Survive 50-mph Car Crashes, N/T, 4/26,

Occupants to Survive ou-mpt. on Assessing 12
GM's Front-Drive "X" Cars, A, 4/26, p. 22
GM's Front-Drive "X" Cars, A, 4/26, p. 22
Will the Wing Car Fly at Indy? A, 5/10, p. 24
Ski-Jump Launch Boosts VSTOL Performance, A, 67, p. 24
100-Mile Range Claimed for City EV, N/T, 7/26, p. 4
Prototype X-Wing Aircraft to be Built, N/T, 7/26, p. 8
New Trainer Readied for Shuttle Astronauts, N/T, 8/9, p. 8

Smart Cars are Coming, N/T, 8/23, p. 10
HiMAT Tries Its Wings and Its Remote Pilot, N/T, 9/6, p. 4
Winter Returns on Mars and Lander 2 Spots Ice, N/T, 9/20, p. 10
1890 Cars, N/T, 9/20, p. 24
Solar Wings Promise Longer Orbiter Missions, N/T, 10/11, p. 4
22 Unmanned Aircraft Joining the Field Artillery, N/T, 10/11, p. 10
Production Starts on VSTOL Light Attack Aircraft, N/T, 10/25, p. 6
Reluctance to Build Transbus Judged Reasonable, N/T, 10/25, p. 10
Return on the Dual-Wheel Trailer, A, 10/25, p. 24
Cargo Loaded on Back of Flatbed Aircraft, N/T, 11/8, p. 4
Super Satellites Promise Practical Pay Off, A, 11/8, p.

p. 4 Super Satellites Promise Practical Pay Off, A, 11/8, p. 18

Single-Baseline Strategic Aircraft, N/T, 11/22, p. 4

Experimental Airline Would Fly Hydrogen-Fueled Freighters, N.T. 11/22, p. 12
Automotive Robot Shifts for Itself, N/T, 12/6, p. 4
A Fight to Save the Full-Size' Car, A. 12/6, p. 24
Flight Plan for Tomorrow: New Shapes, New Materials, A. 12/6, p. 36
Electronic Pain Killers, A. 3/8, p. 28
Student Designers Look at Health Care, A. 6/7, p. 18
The Total Artificial Heart, N/T, 8/23, p. 4
New Pressure Chambers to Train Navy Divers, N/T, 9/20, p. 8
Penetrating Extinguisher Fights Fires Through Walls, S. 3/8, p. 42
New Technology Protects Skiers from Themselves, A, 1/11, p. 20

1/11, p. 20 Hinged Gate Pole Swings Away for Skiers, S, 5/10, p. 40 RECREATION: Fun is Big Business, A, 8/23, p. 18 Pivoting Platforms Steer Skis on Wheels, S, 10/25, p. 46

# CLASSIFICATION SYSTEM

### 1 ELECTRICAL AND **ELECTRONIC**

- Motors and electromechanical actuators
  Motor controls and protectors
  Switches and relays
  Circuit components
  Miscellaneous components
  Interconnections
  Control systems and computers
  Power supplies, conditioners and controls
  Instrumentation

### 2 FLUID POWER

- 21 Fluids 22 Fluid conditioners 23 Fluid conductors

- Linear devices Rotary devices Seals Valves

- Instruments and controls
- 29 Systems and assemblies

### **3 MECHANICAL**

- Power sources Constant-speed drives and transmissions Adjustable-speed drives and transmissions Drive components Rotational components Mechanisms

- Controls Subsystems

41 Fasteners
42 Spring and isolation devices
43 Miscellaneous
44 Measurement equipment

4 ASSEMBLY COMPONENTS

- **5 MATERIALS**
- Ferrous metals Nonferrous metals Plastics Rubber and elastomer

- 55 Joining materials 56 Other nonmetals 57 Finishes, coatings and lubricants 58 Prefabricated forms

# The following organization is authorized to microfilm all of our publications and to supply copies of individual articles, pages or entire issues.

UNIVERSITY MICROFILMS, a Xerox Company, 300 North Zeeb Road, Ann Arbor, Michigan 48106, telephone: (313) 761-4700.

Your order to UM should include this required information:

Number of copies of article needed:

Periodical Title: Title of article: \_\_ Author: \_\_ Date of issue: \_ Volume No.

Inclusive pages to be copied: \_

The standard fee for one copy of a complete article, or portion of the article is \$3.00, including postage. Additional copies of the same article are 50¢ each. Full remittance must accompany this order.

### **6 MANUFACTURING PROCESSES**

- Metal casting Metal shaping Metal forming Metal joining Metal removal Metal treating Finishing

- Metal treating
  Finishing
  Plastics and rubber processes
  Production machinery and plant equipment

### **DESIGN THEORY AND** TECHNIQUES

- Design analysis
  Applied mathematics
  Basic science
  Human factors
  Legal and environmental
  Metrication

### 8 ENGINEERING MANAGEMENT AND OPERATION

- Engineering department operations Product planning and marketing Drafting and reproduction Laboratory and testing Technical information Personal and professional Outside services

### 9 MISCELLANEOUS

- 91 Complete machines 99 Unclassified